Research article

Assessment of the work ability related factors in diabetic patients

Behrang Motamed [a], Aisan Mosafer [b], Mirsaeed Attarchi [c],*

[a] Department of Internal Medicine, School of Medicine, Inflammatory Lung Diseases Research Center, Razi Hospital, Guilan University of Medical Sciences, Rasht, Iran
[b] Razi Clinical Research Development Unit, Razi Hospital, Guilan University of Medical Sciences, Rasht, Iran
[c] Department of Forensic Medicine, School of Medicine, Inflammatory Lung Diseases Research Center, Razi Hospital, Guilan University of Medical Sciences, Rasht, Iran

ARTICLE INFO

ABSTRACT

Diabetes is a common disease all around the world. Diabetes can reduce work and job restrictions. The aim of this study was to assessment of work ability (WA) related factors in diabetic patients. All demographic, occupational, and clinical information of 176 diabetic patients who were referred to the Razi hospital Rasht, Iran, in 2021 was collected. Also, the WA questionnaire for patients with a score from 7 to 49 was completed. The mean score of WA in patients was 28.8. 46.6%, 28.4%, 22.2%, and 2.8% of patients had weak, moderate, good, and excellent WA, respectively. There was a significant association between age, body mass index (BMI), marital status, education, habitat, health insurance status, type of job, job satisfaction status, work shift, underlying disease, history of diabetes, complications of diabetes, fasting blood sugar (FBS), hemoglobin A1c (HbA1C), and WA of patients ($P <$ 0.05). Analysis showed that the variables of job satisfaction and the presence of diabetes complications were significantly associated with the WA. Nearly half of the diabetic patients had weak WA, in which demographic, occupational, and diabetes related factors were associated with weak WA.

1. Introduction

Diabetes is one of the most common endocrine complications that affect the world's population with a growing prevalence [1, 2]. In 2019, it is estimated that 463 million people worldwide suffer from diabetes, and it is predicted that by 2030 and 2045, more than 578 and 700 million people will be affected by this disease, respectively [3]. It is also predicted that in the year 2030 nearly 9.2 million Iranians are likely to have diabetes [4]. In developing countries, most of the progression of diabetes is predicted to affect the productive age group of 45–64 years [5]. A study of 163,770 Iranian populations aged 35–70 years from 2014 to 2020 reported that the prevalence of diabetes was about 15% [6, 7]. The prevalence of this disease in Iran is currently higher in the age upper 45 years old [8]. Therefore, some people with diabetes are of working age. On the other hand, diabetes imposes a significant economic burden on society with either direct or indirect costs such as absenteeism and ineffective presence in the workplace. Employees with diabetes will be associated with reduced efficiency and early retirement. A systematic study by Royo et al. in 2013 found that diabetes reduces the work ability (WA) of workers and is likely to exacerbate the burden of diabetes as the complications become more prevalent in the working age population [9].

In a study in 2016, it was represented that occupational factors and poor blood sugar control in people with type 1 diabetes are associated with the ability to do undesirable work [10]. A meta-analysis study found that diabetes was associated with a rapid increase in the risk of disability [11]. There is only a little information about the WA of diabetic patients in Iran. WA is a situation in which a worker is physically or mentally able to adapt to his/her job needs based on his/her level of health. Some Finnish researchers have developed a questionnaire to measure the WA of workers that is called the work ability index (WAI), which is an important indicator and can objectively measure the balance between the need for work and the WA in workers. Among the applications of this questionnaire, the evaluation of the effectiveness of interventions in the group of workers and also individually to identify workers at risk of disability caused by work can be mentioned [12]. Awareness of the WA and especially the factors that affect it provides a good perspective for occupational health physicians to identify people at risk and take preventive measures for them. Also, by identifying clinical, occupational, and demographic factors along with poor prognosis, it is possible to eliminate them. Due to the frequency of diabetic patients of working age and little information about the WA and the affecting factors in these patients in Iran, we investigated the WA related factors in diabetic

patients who were referred to the diabetic clinic of Razi hospital, Rasht, Iran.

2. Material and methods

2.1. Study design and study population

In this cross-sectional study, through the census method, a total number of 176 diabetic patients who were referred to the diabetes clinic of Razi hospital, Rasht, Iran, during 2021 were selected by convenience sampling method. The demographic, occupational, and clinical data of patients were recorded via a checklist. Demographical data included age, sex, marital status, level of education, habitat, type of health insurance, history of smoking, occupation, work experience, job satisfaction (low, medium, or high) [13, 14], absence from work, shift work, disability, change of job. Clinical characteristics were included body mass index (BMI), underlying disease (except diabetes), type of diabetes, complications of diabetes, history of diabetes, medications, history of hospitalization, systolic blood pressure (SBP), diastolic blood pressure (DBP), hemoglobin (Hb) values, creatinine (Cr), blood urea nitrogen (BUN), fasting blood sugar (FBS), and HbA1C. The informed consent was obtained from all individual participants included in the study; and the WAI questionnaire was completed by the interviewer (medical student). Inclusion criteria included diabetic patients with complete aforementioned data and patients with incomplete data and the pregnant ones were excluded from the study. This research design was approved by the Ethics Committee of Guilan University of Medical Sciences with the ethics code of IR.GUMS.REC.1400.135.

2.2. WAI questionnaire

The WAI questionnaire was designed by Tuomi in 1998 [15] that it estimates and determines the ability and strength of the current and future work situation of the employee. The characteristics of this questionnaire, including the number and content of the questions, and the method of scoring as follows; 1-Ability to do current work compared to the best time of life, 2-Ability to do work related to job needs (physical and mental), 3-Ability to do work due to illness, 4-Number of absences due to illness during last 12 months, 5-Predicting the WA in the next 2 years, 6-Intellectual and mental abilities, and 7-Diseases diagnosed by a doctor. The first dimension consists of a question that scores from 0 to 10, the second dimension consists of two questions that each question scores from 1 to 5, the third dimension contains a question that scores from 1 to 6, the fourth dimension consists of a question that scores from 1 to 5, the fifth dimension includes a question that scores from 1 to 4 or 7, the sixth dimension consists of three questions, each of which scores from 1 to 4, and the seventh dimension contains a question that scores from 1 to 7. The total cores between 7 and 27 are considered weak performance, 28 to 36 are average performance, 37 to 43 are good, and 44 to 49 are excellent [16]. This questionnaire has already been translated into Persian and used in Iranian society. Also, the reliability and validity of this questionnaire have been determined in previous studies [16, 17].

2.3. Statistical analysis

Statistical analysis was performed using SPSS software version 22 and the percentage frequency was used to describe the study variables. Chi-square analysis and Fisher's test were used to examine the relationship between qualitative variables and the WA. The Spearman correlation coefficient test was used to test the study hypotheses. Also for logistic regression analysis, patients with good to excellent WA status were classified as good WA status, patients with weak to moderate WA status were classified as weak WA status, and WA status was considered a dependent variable [18]. The education level, job type (mental, physical), work shift, job satisfaction, underlying disease, type of health insurance, diabetes complications, history of diabetes, and HBA1C rate were considered independent variables. Data were reported as odds ratio (OR) with 95% confidence intervals, and the significance level of 5% was considered.

3. Results

3.1. Socio-demographic variables

Out of 210 patients, 34 individuals had incomplete data, and finally, 176 patients participated in the study. The mean age of patients was 55 years old with a range of 63–34 years and 16.5% of patients were less than 50 years. The BMI of the patients was 26.38 kg/m^2 (21.48–37.80 kg/m^2). 113 (64.2%) patients were women, 142 (80.7%) were married, 98 (55.7%) had a university degree, and 137 (77.8%) were urban. 21 patients (11.9%) had a history of smoking, and 11.2% of patients were not covered by insurance.

3.2. Occupational profile

The average work experience of patients was 20.07 ± 6.17 years with a range of 3–40 years and 37.5% of patients had more than 20 years of work experience. In terms of patients' job satisfaction, 80 individuals (45.5%) had low job satisfaction, 60 (34.1%) had moderate job satisfaction, and 36 (20.5%) had high job satisfaction. 61 patients (34.7%) reported a history of absenteeism; 45.1% of the diabetic patients studied had shift work; 7 patients (4%) had a history of a job change; 94 individuals (53.4%) had physical jobs and 82 patients (46.6%) had mental jobs.

3.3. Laboratory and clinical characteristics

There were 21 patients (11.9%) and 156 patients (88.1%) with type 1 and type 2 diabetes, respectively. The mean history of diabetes existence was 11.2 years (2–23 years). 102 patients (58%) had underlying diseases; 64 patients (36.4%) had complications from diabetes; 6 patients (3.4%) with diabetes reported hospitalization; 140 patients (79.5%) used oral glucose control drugs, 17 patients (9.7%) used injectable blood glucose control drugs, and 19 patients (10.8%) used both oral and injectable blood glucose control drugs. 16 patients (9.1%) had a history of hypoglycemic attack and 6 patients (3.4%) had a history of hyperglycemia. The mean SBP and DBP were 131.93 mm Hg and 79.93 mm Hg, respectively. Mean Hb, Cr, and BUN were 13.24 g/dl, 1.15 mg/dl, and 16.29 mg/dl, respectively. The FBS mean was 143 ± 38.28 mg/dl (70–329 mg/dl) and the mean HbA1C was $7.13 \pm 1.25\%$ (5.5–12.9%).

3.4. Work ability score

The mean score of WA in patients was 28.86 ± 8.96 (9–46). According to the WA score, 82 patients (46.6%), 50 patients (28.4%), 39 patients (22.2%), and 5 patients (2.8%) were in the range of weak, moderate, good, and excellent, respectively. There was a statistically significant relationship between age, BMI, marital status, level of education, habitat, and health insurance status in terms of patients' WA ($P < 0.05$) (Table 1). Thus, upper age, higher BMI, less education, rural residence, lack of health insurance, and being married were accompanied by a lower frequency of the ability to do excellent work, but this relationship was not reported regarding gender and smoking, ($P > 0.05$). Also, there was a significant relationship between job type, job satisfaction status, work shift, the presence of underlying disease, history of diabetes, and complications of diabetes in patients with diabetic according to the patients' WA ($P < 0.01$) (Table 2). There was a weak association between WA and the variables of physical occupation, low job satisfaction status, night shift, underlying disease, complications of diabetes, and history of diabetes with more frequency. However, this association was not observed in work experience, type of diabetes, history of hypoglycemia

and hyperglycemia, history of hospitalization, and type of medication variables ($P > 0.05$).

A statistically significant difference was observed between the mean of Cr, BUN, FBS, and HbA1C levels according to WA status in patients with diabetes ($P < 0.001$), which was higher in the group with poor WA (Table 3). Also, a significant association was reported between HbA1C and WA ($P = 0.001$), which the frequency of the WA from good to excellent was significantly higher in HbA1C ≤ 7% group (Table 4). Logistic regression analysis showed that low job satisfaction reduced the WA by 16 times ($P = 0.001$) and the presence of diabetes complications reduced it by 4.5 times ($P = 0.049$) (Table 5).

4. Discussion

WA indicates a balance between personal resources, health status, and job needs. In this study, we investigated the association between work related factors and WA among diabetic patients. In our study, the average score of the WAI was 28.86, which means nearly half of the patients were in the weak WA range. A systematic review by Wong et al. found that diabetes was associated with a remarkable increase in the risk of disability [11]. Another study by Breton et al. on the impact of diabetes on the WA showed that diabetes appears to reduce a person's WA, and also illustrated that there is a need to launch a diabetes prevention program and implement effective targeted interventions to help workers better manage their disease [9]. The results of a study by Krstovic-Spremo et al. showed that diabetes seemed to further reduce the WA compared to patients with high blood pressure [19]. The results of our study showed that almost one in two working people with diabetes assesses their WA as weak, which is even more challenging than the results of previous studies, which can be due to differences in the amount of workplace support (employers and partners), insurance organizations, and the level of access to health services. Also, their

results represented that one in three employees with type 1 diabetes had weak WA. High job demands, low job control, physical work, and low time control were associated with weak WA. High levels of self-reported HbA1c were the only diabetes-related variables associated with weak WA. Also, work related factors and poor blood sugar control were associated with weak WA in people with type 1 diabetes [10].

In our study, there was a statistically significant relationship between job type, job satisfaction status, and work shift in diabetic patients in terms of patients' WA. Physical work often means working in places that have potentially few opportunities to measure blood glucose levels and may work in unsanitary conditions and have to inject insulin. Diabetics need the care to monitor and control their blood sugar throughout the workday. Shift work can also change the rhythm of insulin secretion and control blood sugar by changing the rhythm of circadian. Our results represented a significant association between the presence of underlying disease, history of diabetes, and complications of diabetes in diabetic patients in terms of the WA. In previous studies, the complications of diabetes have been mentioned as predictors of disability, job performance status, and WA in the long run [10, 20, 21]. Also, due to our results, it was found that there was a significant difference between the mean of FBS and HbA1C in terms of WA in patients with diabetes ($P < 0.001$). It was illustrated that the highest mean of FBS and HbA1C was found in the group with the weak WA. Moreover, in the group of individuals with HbA1C ≤ 7%, the highest frequency of WA from good to excellent was seen.

In the study of Kazemi et al. which aimed to evaluate the performance of 94 diabetic patients based on the international classification of functioning disability and health (ICF), the results showed that using ICF as a framework for assessing and determining the health status of diabetic patients, the WA in patients with diabetes is not at the desired level and the performance and WA in them decreases with increasing

Table 1. The association between demographical data of diabetic patients with work ability index.

Variables	Work ability index								P value
	Weak (7–27)		Moderate (28–36)		Good (37–43)		Excellent (44–49)		
	Number	%	Number	%	Number	%	Number	%	
Age (years)									
<55	24	33.3	25	34.7	20	27.8	3	4.2	
56-60	45	52.3	23	26.7	16	18.6	2	2.3	0.007
60<	13	72.2	2	11.1	3	16.7	0	0	
BMI* (kg/m^2)									
1-25	11	22.9	20	41.7	15	31.2	2	4.2	
25-30	58	51.3	29	25.7	23	20.4	3	2.7	0.001
30<	13	86.7	1	6.7	1	6.7	0	0.0	
Marital status									
Married	63	44.4	44	31.0	34	23.9	1	0.7	
Single	19	55.9	6	17.6	5	14.7	4	11.8	0.002
Educational level									
Under diploma	24	75.0	4	12.5	4	12.5	0	0.0	
Diploma	27	58.7	14	30.4	5	10.9	0	0.0	0.005
University degree	32	32.6	32	32.6	29	29.6	5	5.1	
Habitat									
Urban	55	40.1	43	31.4	34	24.8	5	3.6	0.13
Rural	27	69.2	7	17.9	5	12.8	0	0.0	
Insurance type									
Social security	53	57.0	23	24.7	16	17.2	1	1.1	
Health insurance	9	23.1	15	38.5	12	30.8	3	7.7	0.001
Other	5	20.8	8	33.3	10	41.7	1	4.2	
No insurance	15	75.0	4	20.0	1	5.0	0	0.0	

*Body mass index.

Table 2. The association between clinical characteristics and occupational data of diabetic patients with work ability index.

Variables	Work ability index								P value
	Weak		Moderate		Good		Excellent		
	Number	%	Number	%	Number	%	Number	%	
Type of job									
Physical	78	83.0	12	12.7	3	3.2	1	1.1	0.001
Mental	59	71.9	12	14.6	10	12.2	1	1.3	
Level of satisfaction									
Low	75	93.8	5	6.2	0	0.0	0	0.0	0.001
Medium	6	10.0	36	60.0	15	25.0	3	5.0	
Much	1	2.8	9	25.0	24	66.7	2	5.6	
Shift work									
Fixed morning	9	11.4	37	46.8	30	38	3	3.8	
Shifts in circulation	70	74.5	13	13.8	9	9.6	2	2.1	0.001
Fixed night	3	100	0	0.0	0	0.0	0	0.0	
Underlying disease									
Yes	67	65.7	24	23.5	11	10.8	0	0.0	0.001
No	15	20.3	26	35.1	28	37.8	5	6.8	
History of diabetes (years)									
<5	1	2.6	14	35.9	20	51.3	4	10.3	
6–15	29	37.2	32	41.0	17	21.8	0	0	0.001
15<	52	88.1	4	6.8	2	3.4	1	1.7	
Diabetes complications									
Yes	46	71.9	13	20.3	5	7.8	0	0.0	0.001
No	36	32.1	37	33.0	34	30.4	5	4.5	

Table 3. The association between laboratory findings and occupational data of diabetic patients with work ability index.

Variables	Work ability index				P value
	Weak	Moderate	Good	Excellent	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Hemoglobin (g/dl)	12.9 ± 1.2	13.3 ± 1.2	13.5 ± 1.1	13.6 ± 1.2	0.091
Creatinine (mg/dl)	1.3 ± 0.2	1.0 ± 0.1	0.9 ± 0.1	0.8 ± 0.1	<0.001
BUN* (mg/dl)	19.9 ± 5.0	14.1 ± 3.4	12.2 ± 3.0	10.4 ± 0.8	<0.001
FBS** (mg/dl)	164.8 ± 43.0	126.6 ± 19.8	120.1 ± 16.2	116.2 ± 13.9	<0.001
HbA1c (%)	8.0 ± 1.1	6.5 ± 0.6	6.1 ± 0.3	6.0 ± 0.1	<0.001

*Blood urea nitrogen.
**Fasting blood sugar.

blood sugar levels [22]. In the study by Hakkarainen et al., the results showed that poor glycemic control and high levels of HbA1c in patients with type 1 diabetes were associated with weak WA [10]. In our study, after adjusting for confounding factors, it was found that job satisfaction and the presence of diabetes complications were associated with the WA. Consequently, low job satisfaction and the presence of diabetes complications reduce the WA in diabetic.

Table 4. The association between HbA1c level and occupational data of diabetic patients with work ability index.

HbA1c*	Work ability index		OR	95% CI	P value
	Weak to moderate N (%)	Good to excellent N (%)			
≤7%	2 (4.5)	42 (95.4)	0.3	7.0–130.6	<0.001
7%<	78 (59.0)	54 (40.9)			

*HemoglobinA1c.

5. Limitation

According to the cross-sectional nature of the present study, it was impossible to comment on the causal relationship with certainty. It was

Table 5. The association between work ability and study variables of diabetic patients based on logistic regression analysis.

Variable	β	Adjusted O.R	95%CI	P value
Constant	13.4	71.0	-	0.998
Job satisfaction				
High	-	1.0	-	-
Medium	1.9	7.0	1.2–30.1	0.043
Low	2.7	16.0	3.5–73.2	0.001
Diabetes complications				
No	-	1.0	-	0.049
Yes	1.5	4.5	1.0–21.8	

also possible that a healthy worker effect on the relationship between HbA1c levels, the complications of diabetes, and the duration of diabetes with WA. This present study is the first study that evaluates the ability of diabetics to work with the WAI in Iran.

6. Conclusion

About half of diabetics had weak WA, and demographic factors such as age, BMI, marital status, lower education, rural residency, and lack of health insurance, and also occupational factors such as low job satisfaction, physical work, shift work, and diabetes related factors such as elevated HbA1C and FBS, increased history of diabetes, and complications of diabetes were associated with weak job performance. The most important predictor variables were work ability, diabetes complications, and job satisfaction. Therefore, control of occupational factors should be considered in monitoring and supporting workers with diabetes, and the necessary interventions to properly control blood sugar and prevent the complications of diabetes can play a key role in improving the WA.

Declarations

Author contribution statement

Behrang Motamed: Conceived and designed the experiments; Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Aisan Mosafer: Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper.

Mirsaeed Attarchi: Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Funding statement

Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

Acknowledgements

References

[1] E. Adeghate, P. Schattner, E. Dunn, An update on the etiology and epidemiology of diabetes mellitus, Ann. N. Y. Acad. Sci. 1084 (2006) 1–29.

[2] M. Sharma, I. Nazareth, I. Petersen, Trends in incidence, prevalence and prescribing in type 2 diabetes mellitus between 2000 and 2013 in primary care: a retrospective cohort study, BMJ Open 6 (2016), e010210.

[3] P. Saeedi, I. Petersohn, P. Salpea, B. Malanda, S. Karuranga, N. Unwin, et al., Global and Regional Diabetes Prevalence Estimates for 2019 and Projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, ninth ed., 157, Diabetes Res Clin Pract, 2019.

[4] A. Hussain, S. Vaaler, M.A. Sayeed, H. Mahtab, S.M.K. Ali, A.K.A. Khan, Type 2 diabetes and impaired fasting blood glucose in rural Bangladesh: a population-based study, Eur. J. Publ. Health 17 (2007) 291–296.

[5] S. Wild, G. Roglic, A. Green, R. Sicree, H. King, Global prevalence of diabetes: estimates for the year 2000 and projections for 2030, Diabetes Care 27 (2004) 1047–1053.

[6] M.E. Khamseh, S.G. Sepanlou, N. Hashemi-Madani, F. Joukar, A.H. Mehrparvar, E. Faramarzi, et al., Nationwide prevalence of diabetes and prediabetes and associated risk factors among Iranian adults: analysis of data from Persian cohort study, Diabetes Ther 12 (2021) 2921–2938.

[7] A. Esteghamati, M.M. Gouya, M. Abbasi, A. Delavari, S. Alikhani, F. Alaedini, et al., Prevalence of diabetes and impaired fasting glucose in the adult population of Iran: national survey of risk factors for non-communicable diseases of Iran, Diabetes Care 31 (2008) 96–98.

[8] H. Harati, F. Hadaegh, N. Saadat, F. Azizi, Population-based incidence of Type 2 diabetes and its associated risk factors: results from a six-year cohort study in Iran, BMC Publ. Health 9 (2009) 186.

[9] M.-C. Breton, L. Guénette, M.A. Amiche, J.-F. Kayibanda, J.-P. Grégoire, J. Moisan, Burden of diabetes on the ability to work: a systematic review, Diabetes Care 36 (2013) 740–749.

[10] P. Hakkarainen, L. Moilanen, V. Hänninen, J. Heikkinen, K. Räsänen, Work ability among Finnish workers with type 1 diabetes, Occup. Med. (Lond.) 66 (2016) 446–453.

[11] E. Wong, K. Backholer, E. Gearon, J. Harding, R. Freak-Poli, C. Stevenson, et al., Diabetes and risk of physical disability in adults: a systematic review and meta-analysis, Lancet Diabetes Endocrinol. 1 (2013) 106–114.

[12] S.M. Alavinia, S.H. Hosseini, The work ability index, an important tool in occupational health and medicine to define workers at risk for early exit from work force, J. North Khorasan Univ. Med. Sci. 32 (8) (2011) 49–53.

[13] F.-F. Chung, C.-C.C. Yao, G.-H. Wan, The associations between menstrual function and life style/working conditions among nurses in Taiwan, J. Occup. Health 47 (2005) 149–156.

[14] M. Attarchi, H. Darkhi, M. Kashanian, M. Dolati, M. Ghaffari, E. Mirzamohammadi, et al., Characteristics of menstrual cycle in shift workers, Global J. Health Sci. 5 (2013) 163.

[15] J. Ilmarinen, The work ability index (WAI), Occup. Med. (Chic Ill) 57 (2007).

[16] M. Adel, R. Akbar, G. Ehsan, Validity and reliability of work ability index (WAI) questionnaire among Iranian workers; a study in petrochemical and car manufacturing industries, J. Occup. Health 61 (2019) 165–174.

[17] M. Abdolalizadeh, A.A. Arastoo, R. Ghsemzadeh, A. Montazeri, K. Ahmadi, A. Azizi, The psychometric properties of an Iranian translation of the Work Ability Index (WAI) questionnaire, J. Occup. Rehabil. 22 (2012) 401–408.

[18] K. Glise, E. Hadzibajramovic, I.H. Jonsdottir, G.J. Ahlborg, Self-reported exhaustion: a possible indicator of reduced work ability and increased risk of sickness absence among human service workers, Int. Arch. Occup. Environ. Health 83 (2010) 511–520.

[19] V. Krstović-Spremo, M. Račić, B.N. Joksimović, V.R. Joksimović, The effects of diabetes mellitus and hypertension on work productivity, Acta Med. Acad. 43 (2014) 122–133.

[20] E. Ghanassia, L. Villon, J.-F. Thuan Dit Dieudonné, C. Boegner, A. Avignon, A. Sultan, Long-term outcome and disability of diabetic patients hospitalized for diabetic foot ulcers: a 6.5-year follow-up study, Diabetes Care 31 (2008) 1288–1292.

[21] H.D.S. Cabeceira, D.M.S.T. de Souza, Y. Juliano, D.F. Veiga, Work ability and productivity in patients with diabetic foot, Clinics (Sao Paulo) 74 (2019) e421.

[22] F. Kazemi, A. Hasani Mehraban, M. Akbarfahimi, Evaluation of function in diabetic patients based on the international classification of functioning, disability and health (ICF), mrj 9 (2016) 110–118.